



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE

United States Patent and Trademark Office

Address: COMMISSIONER FOR PATENTS

P.O. Box 1450

Alexandria, Virginia 22313-1450

www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/571,751	01/22/2007	Fumio Kuriyama	2006_0318A	9879
513 7590 05/18/2009 WENDEROTH, LIND & PONACK, L.L.P. 1030 15th Street, N.W., Suite 400 East Washington, DC 20005-1503				
EXAMINER				
WILKINS III, HARRY D				
ART UNIT		PAPER NUMBER		
1795				
MAIL DATE		DELIVERY MODE		
05/18/2009		PAPER		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/571,751

Applicant(s)

KURIYAMA ET AL.

Examiner

Harry D. Wilkins, III

Art Unit

1795

Period for Reply -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 March 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 26-28 and 44-47 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 26-28 and 44-47 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 13 March 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Specification

1. The substitute specification filed by Applicant on 2 March 2009 is entered.

Claim Rejections - 35 USC § 103

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.
3. Claims 26, 28, 44 and 45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nelsen et al (US 2004/0069644) in view of Schuler et al (US 6,399,022).

Nelsen et al teach (see abstract, figures and paragraphs 9-26) an apparatus for plating of substrates including a water process chamber (308) configured to bring the surface of the substrate into contact with water for the purpose of removing contamination, including organic contaminants, from the surface of the substrate, a plating chamber (310) configured to plate the surface of the substrate after the pre-cleaning and a frame (shown generally as 300) housing both the water process chamber and the plating chamber.

Thus, the difference between the teachings of Nelsen et al and the presently claimed invention is that Nelsen et al do not teach using ozone water in the water process chamber. Nelsen et al teach (see paragraph 13) that although deionized water was discussed, that other aqueous solutions could be used to perform the pre-cleaning step.

Schuler et al teach (see abstract, figures and col. 1, lines 12-15 and col. 3, line 41-44) generation of ozone water for the purpose of providing a cleaning fluid for removing contaminants, particularly organic contaminants, from the surface of a substrate prior to further processing.

Therefore, it would have been obvious to one of ordinary skill in the art to have substituted the ozone water of Schuler et al for the deionized water of Nelsen et al for performing the pre-cleaning step in the water process chamber because the ozone water would have achieved a better removal of organic contaminants due to the presence of the ozone.

Regarding Applicant's amendment to claim 26 requiring that the ozone water created a reformed surface of an organic resist film on the substrate and so as to remove organic substances remaining on exposed surfaces of an underlying film at a bottom of a resist pattern of the organic resist film and that the plating chamber was configured to plate the exposed surfaces of the underlying film at the bottom of the resist pattern, these limitations are directed to the method of using the claimed plating apparatus. See MPEP 2114. None of these limitations provide any structural differences for the apparatus. Applicant is reminded that apparatus claims must be distinguished from the prior art by structure, not by intended use.

Regarding claim 28, Schuler et al teach (see abstract and figures) that the ozone water generator included a dissolution membrane (103) through which ozone gas was diffused into pure water.

Regarding claim 44, Schuler et al teach (see figures 1, 1a and 2 and col. 2, line 21 to col. 3, line 47) that the ozone water generator included an ozonator (200) for producing ozone from oxygen gas and the dissolution membrane (103) was arranged to receive the ozone gas in its interior and water at its exterior surface to dissolve the ozone gas into the water.

Regarding claim 45, Nelsen et al teach (see figure 1 and paragraph [0019]) that the water process chamber included a rotatable stage (wafer support 220) for supporting the substrate in a horizontal orientation and a spray nozzle (rinse arm 240) for spraying water onto the surface of the substrate while it is rotated by the wafer support. Although Nelsen et al fails to teach that the rinse arm contained a plurality of spray heads, one of ordinary skill in the art would have found it obvious to have provided sufficient coverage of the sprayed water onto the surface of the substrate by providing as many spray heads as necessary.

4. Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nelsen et al (US 2004/0069644) in view of Schuler et al (US 6,399,022) as applied to claims 26 and 28 above, and further in view of Taylor (US 6,555,170).

The teachings of Nelsen et al and Schuler et al are described above. Further, Schuler et al teach that treatment with the ozone water (see col. 1, lines 12-15) causes both removal of contaminants from the treated surface and also forms an oxide film on the treated surface.

However, it was known in the art of copper electroplating that such surface oxides were detrimental to the copper electroplating step.

Taylor teaches (see col. 1, lines 19-39) that a final acid cleaning step occurs to remove any built up oxides which inhibit efficient plating.

Therefore, it would have been obvious to one of ordinary skill in the art to have added an acid treatment chamber, as suggested by Taylor, to cause removal of any surface oxide film built up by the ozone water treatment of Schuler et al to ensure that the surface oxides do not inhibit the efficient copper electroplating of Nelsen et al.

5. Claim 46 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nelsen et al (US 2004/0069644) in view of Schuler et al (US 6,399,022) as applied to claims 26, 28, 44 and 45 above, and further in view of Sasaki et al (US 5,785,068).

In the water process chamber of Nelsen et al, the side wall is stationary and the wafer support stage (wafer support 220) was vertically movable to permit the wafer to be placed onto the stage and removed from the stage.

However, in the art of spin-rinse-dry stations, it was known that other configurations were permissible to allow the wafer to be placed on the wafer support stage.

For example, Sasaki et al teach (see abstract, figure 1 and col. 3) that another configuration of such a spin-rinse-dry station included a stationary wafer support stage (turntable 3) and a vertically movable cap 5, which corresponds to the claimed side wall.

Therefore, since the prior art recognized the suitability of arranging a spin-rinse-dry station where either the stage vertically moves up out of the chamber or where the side wall vertically moves down to expose the stage to permit the wafer to be grasped by a wafer transfer robot, it would have been obvious to one of ordinary skill in the art to

have utilized either conventional configuration for the water process chamber of Nelsen et al to obtain suitable results.

6. Claim 47 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nelsen et al (US 2004/0069644) in view of Schuler et al (US 6,399,022) as applied to claims 26, 28, 44 and 45 above, and further in view of Kamikawa et al (US 6,082,381).

In the water process chamber of Nelsen et al, the water process chamber is designed to treat the wafer in a horizontal orientation.

However, in the art of liquid treatment of individual semiconductor wafer substrates, it was known that other configurations were permissible to allow the wafer to be treated by a liquid.

For example, Kamikawa et al teach (see abstract, figure 3 and cols. 5-6) that another configuration of such a liquid treatment station included a vertically oriented wafer support, a tank into which the wafer was immersed and a plurality of ejection nozzles connected by a supply pipe to the treatment liquid.

Therefore, since the prior art recognized the suitability of arranging a liquid treatment station where either the station holds the wafer in a horizontal orientation or a vertical orientation, it would have been obvious to one of ordinary skill in the art to have utilized either conventional configuration for the water process chamber of Nelsen et al to obtain suitable results.

Terminal Disclaimer

7. The terminal disclaimer filed on 2 March 2009 disclaiming the terminal portion of any patent granted on this application which would extend beyond the expiration date of

any patent granted on US Patent Application No. 10/544,623 has been reviewed and is accepted. The terminal disclaimer has been recorded.

Response to Arguments

8. Applicant's arguments filed 2 March 2009 have been fully considered but they are not persuasive. Applicant has argued that the prior art fails to teach a ozone water process chamber configured to operate as claimed.

In response, as noted in the rejection grounds above, Applicant's amended limitations relate to the intended use of the claimed structure, and as such, per MPEP 2114 and established case law, the further limitations fail to further limit the structure of the claimed apparatus.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Harry D. Wilkins, III whose telephone number is 571-272-1251. The examiner can normally be reached on M-F 8:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Harry D Wilkins, III/
Primary Examiner, Art Unit 1795

hdw